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(54) Swingable junction for blind track.

(57) A corner junction assembly for use with two adjacent lengths of blind track has a bearing ring means making a captive frictional fit in a bearing hub means to permit relative rotation of those two parts. The corner junction assembly comprises track engagement means connected to respective ones of the bearing ring means and the bearing hub means and adapted to be connected to the ends of the adjacent lengths of the tracks. The corner junction assembly also comprises movement transmission means for transmitting movement from a traveller control means, such as a control cord or rod, in one of the lengths of track to a traveller control means in the other length of track.

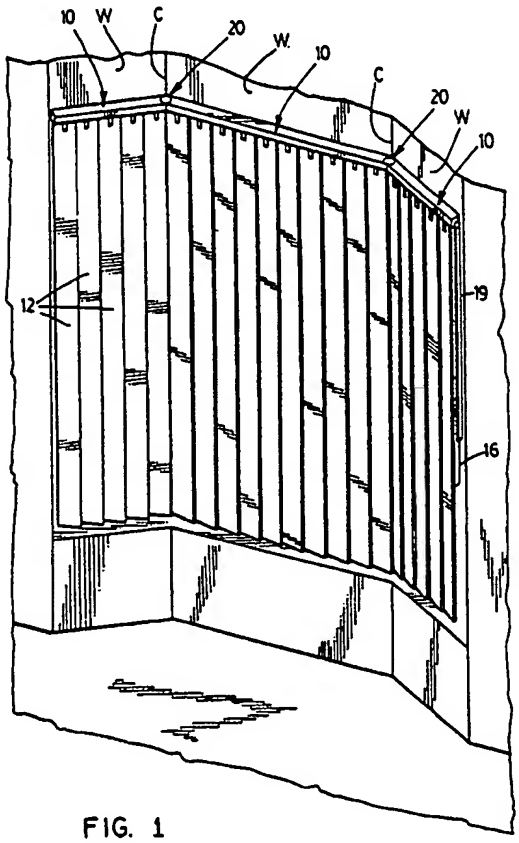

FIG. 1

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SWINGABLE JUNCTION FOR BLIND TRACK

FIELD OF THE INVENTION

The invention relates to a blind apparatus and, in particular to a corner junction assembly for use in connecting two adjacent lengths of blind track.

BACKGROUND OF THE INVENTION

Vertical slat blinds are well known and comprise a track having a plurality of blind travellers movable therealong. Vertical blind slats are suspended from the travellers. The travellers can be drawn to and fro along the track, and the individual blind slats can be rotated so as to open or close the blinds.

Traveller operating or control means extend along the track and hang downwardly from one end of the track.

The installation of two or more lengths of blind track, which meet at a corner, presents certain problems, particularly in the arrangements for the traveller control means.

One form of arrangement for such a corner junction assembly is described in U.S. Letters Patent 4,653,564, dated March 31, 1987 - Inventor Norbert Marocco, entitled "Track for Blinds."

Using the system disclosed in the aforesaid patent, it is possible to joint the two tracks at a corner and to provide for the traveller control means to extend around the corner. In this way, the traveller control means, that is to say both the traveller moving means and also the blind slat rotation means, can be located at one end of one length of the track, and all of the blind travellers in both lengths of track can be operated simultaneously.

The system disclosed in the aforesaid patent has proved to be highly satisfactory in use, and has achieved considerable commercial success.

However, certain problems have arisen as a result of the experience of using the aforesaid system. In particular, it is desirable to have a corner junction assembly which is capable of hinging or swinging, and then being set in a desired angle, so as to fit a particular window, or other installation.

One form of corner junction means is shown in the aforesaid patent and has proved to be satisfactory. However, it incorporates several different components which must be assembled together during assembly of the blind and this may, in practice, require a certain amount of skill. In addition, the practice for assembling such blinds is to, first of all, assemble the lengths of track in the factory, and set them at the correct angle. The traveller operating means are then adjusted as to length so as to extend around the correct arc at each corner.

Once all of this has been done, the blind installation is then disassembled and shipped but then must be reassembled on the customer's premises.

In order to do this satisfactorily it is desirable to have a corner junction assembly which can be preset at a predetermined angle, so that when disassembled and then reassembled, it will go together in the correct fashion.

It is also desirable that the corner junction assembly shall be as short as possible. In blinds of this type, the blind slats are moved along the separate lengths of track in separate groups, although they are in fact moved simultaneously. When drawn fully to one side, the blind slats will hang, in groups, at the ends of their respective lengths of track. In order to avoid obstructing the ends of the tracks, it is thus desirable that the corner junction assembly at the ends of the tracks shall be as short as possible.

SUMMARY OF THE INVENTION

With a view to overcoming the various problems listed above, the invention comprises a corner junction assembly for use in association with two adjacent blind tracks, such tracks each being adapted to carry slat-carrying travellers and each having at least one movable traveller control means, the corner junction assembly comprising at least one bearing ring means; at least one bearing hub means making a captive frictional fit within the bearing ring means to permit relative rotation thereof; track engagement means connected to respective ones of the bearing ring means and the bearing hub means for engagement with adjacent ends of respective ones of the tracks; and at least one movement transmission means adapted to be coupled to and to transmit movement from the traveller control means in one of the blind tracks to the traveller control means in the other of the blind tracks.

Usefully, a corner junction assembly in accordance with this invention comprises upper and lower bearing ring means and upper and lower bearing hub means, the upper bearing hub means making a captive frictional fit within the upper bearing ring means and the lower bearing hub means making a captive frictional fit within the lower bearing ring means, and the upper and lower bearing

ring means being spaced apart.

Such a corner junction assembly is usefully provided with an opening in one of the upper and lower bearing hub means and a removable closure means is provided for closing the opening.

In accordance with a particularly preferred feature of this invention, a corner junction assembly in accordance therewith includes a downwardly dependent arcuate cup member formed integrally with the upper bearing hub means, and a bearing surface of corresponding shape is formed on the upper bearing ring means to guidingly engage the exterior of the cup member.

Such a cup member is usefully formed with a plurality of fracture lines parallel to one another at spaced intervals therearound, whereby portions of the cup member may be broken away during installation of the corner junction assembly with the blind tracks to accommodate different angular positions of those blind tracks.

The bearing hub means of a corner junction assembly in accordance with this invention is usefully formed with a locking ring making a captive pressure fit within the bearing ring means.

In one embodiment of a corner junction assembly according to the invention, the movement transmission means comprises at least one length of control cord integrally formed with control cords in each of the tracks and constituting the aforementioned traveller control means, as well as at least one pulley for guiding such length of the control cord. In one particular embodiment, such pulleys are mounted externally on the corner junction assembly.

Another embodiment of a corner junction assembly according to the invention is intended for use with blind tracks in which the traveller control means are rotationally mounted and in such an embodiment such movement transmission means is adapted to transmit rotational movement between the traveller control means of the two blind tracks. Such a rotatable mounted movement transmission means can comprise a flexible coupling and at least one bearing means supporting the flexible coupling.

Usefully, such a flexible coupling is adapted to be connected to the traveller control means for conjoint rotation therewith but in such a manner that axial movement of the flexible coupling relative to at least one of the traveller control means is possible to accommodate different angular positions of the blind tracks.

In another embodiment, such rotatably mounted movement transmission means comprises interengaged gear means adapted to be secured to ends of the traveller control means of the blind tracks for conjoint rotation therewith. In one embodiment, such gear means are adapted to be secured to the ends of the traveller control means for conjoint rotation therewith while permitting axial movement of the gears means relative to at least one of the traveller control means to accommodate different angular positions of the tracks.

Spring means are usefully provided to maintain such gear means in engagement with each other regardless of the relative angular positions of the tracks. If, however, such gear means are disposed for rotational movement through a rotational axial position of the corner junction assembly, then there is no need for relative axial movement of the gear means and the traveller control means during movement of the blind tracks into different angular positions.

The various features of novelty which characterize the invention are pointed out with more particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its use, reference should be had to the accompanying drawings and descriptive matter in which there are illustrated and described preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described merely by way of illustration with reference to the accompanying drawings in which:

Figure 1 is a general perspective illustration of one embodiment of a blind installation or apparatus in accordance with this invention, and shown as extending along three walls which meet at two corners;

Figure 2 is a bottom plan view, looking upwardly of one embodiment of a corner junction assembly as used in the blind assembly as shown in Figure 1 and with certain parts omitted to reveal its internal construction;

Figure 3 is a sectional view when taken as indicated by the arrows 3-3 of Figure 2;

Figure 4 is an exploded perspective illustration of the corner junction assembly shown in Figures 1 to 3;

Figure 5 is a cut-away perspective view of the same corner junction assembly with certain parts omitted;

Figure 6 is a schematic perspective view of one embodiment of a traveller and traveller control means used in the blind installation shown in the preceding figures;

Figure 7 is a schematic perspective view of a second embodiment of a traveller and control means which can be used in a blind installation in accordance with this invention;

Figure 8 is a perspective exploded illustration of a flexible coupling for use in a corner junction assembly in accordance with this invention;

Figure 9 is a perspective illustration of an alternative form of coupling for use in this invention;

Figure 10 is an exploded sectional view when taken as indicated by the arrows 10-10 of Figure 9;

Figure 11 is a rear perspective illustration of an alternative embodiment of a corner junction assembly in accordance with this invention; and

Figure 12 is a sectional view through another embodiment of a corner junction assembly in accordance with this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring first of all to Figure 1, it will be seen that the invention is illustrated therein as a blind installation mounted in a situation in which there are three wall surfaces indicated generally as W, meeting at two corners indicated generally as C.

Typically, this represents a bay window installation. However, blinds may be used in bay windows, or may be used to cover other openings or other surfaces, and the invention is not to be taken as exclusively limited to use in association with bay windows or, in fact, windows of an kind.

A plurality, in this case, three, lengths of blind tracks generally indicated at 10, are shown mounted on the walls W, with the three lengths of track 10 meeting at the two corners C.

From the tracks 10 a plurality of slats 12 hang downwardly from the travellers 14.

Traveller control means are provided which, in this embodiment of the invention, are indicated as the control or pull cord 16 and the control rod 18. The cord 16 hangs downwardly at one end of one of the tracks 10 and is operative to move the slats 12 along the tracks 10. The control rod 18 is rotatable by movement of a control chain 19 to adjust the angular position of the slats 12 relative to the tracks 10. The hanging portion of the cord 16 and the control chain 19 are shown in a horizontal position in Figure 2 to clarify their functions.

It will be appreciated that the showing of a control cord 16 and a control rod 18 are merely illustrated as the traveller control means in general. Various different designs of traveller control means are possible and the invention is not intended to be restricted to any particular form of traveller control means.

The tracks 10 and slats 12 may be of entirely conventional construction, such as are well known in the art and are made by a number of different manufacturers and are not, therefore, described in any detail, for the sake of clarity.

As shown generally in Figure 1, the three lengths of blind track 10 are joined at the two corners C by means of corner junction assemblies in accordance with this invention and as indicated generally at 20.

Referring now to Figure 4, the corner junction assembly 20 in accordance with the invention will be seen to comprise five separate moulded components, namely an upper bearing ring member or means 22, an upper bearing hub member or means 24, a lower bearing ring member or means 26, a lower bearing hub member or means 28, and a closure means or plate 30, provided for the sake of appearance.

Upper bearing ring member 22 comprises a generally annular bearing means 32, and an upstanding annular wall 34, forming an L-shaped structure in section.

Along one side of the junction between the bearing means 32 and the wall 34, there is formed a downwardly dependent end plate 36, with a guidance opening or bearing 38 formed therethrough.

A pair of generally rectangular track engagement means or mounting block members 40 are also integrally formed with the upper bearing ring member 22 and extend more or less normal thereto on either side of the plate 36 to define openings 41 on either side thereof.

A bearing surface or arcuate guidance cuff 42 is formed integrally with one of block members 40 and the annular bearing means 32. A guidance pulley 43 is mounted on a guidance wedge portion 44 formed integrally with the other of blocks 40. A screw receiving recess 45 is formed in cuff 42.

The upper bearing hub member 24 comprises an annular bearing hub 46, having an upper free edge terminating in a locking ring 48. Hub 46 and ring 48 are intended to make a snap fit through the bearing means 32, and to be rotatable therein.

A flat disc-like plate 50 is formed integrally with the lower edge of the bearing hub 46. A generally partially cylindrically shaped downwardly dependent wall or cup member 52 extends downwardly from the perimeter of plate 50, thus forming what may be called an inverted cup-shaped structure.

Fracture or break lines 54 (shown in Figure 4 but omitted from Figure 3) are provided in the wall 52 for a purpose yet to be described.

A downwardly-dependent planar flange 58, having a guidance opening or bearing means 60, is provided on plate 50 and has openings 61 on both sides for a reason yet to be described.

Two generally wedge-shaped block portions 64 and 66 are formed on the exterior of the generally

cylindrical wall 52. A screw-receiving recess 68 is usefully formed in the block portion 64 for a reason yet to be described.

A guidance pulley 69 is mounted on block portion 66.

Track engagement means or mounting block members 70 are formed on respective blocks 64 and 66, for engagement with one of the blind tracks 10.

The lower bearing ring member 26 comprises an annular bearing ring 72, with an arcuate guidance cuff 74 formed therearound. An attachment flange 76 extends from the guidance cuff 74, and is usefull provided with a screw hole opening 78.

A screw 80 passes through opening 78 and is received in screw receiving recess 45 in cuff 42 of upper bearing ring member 22.

The lower bearing hub member 28 comprises a bearing hub ring 82, having at its upper free edge a locking ring 84. Rings 82 and 84 makes a snap fit within bearing ring 72 of bearing ring member 26, and are rotatable relative to one another. A generally outwardly-extending bearing flange 86 is formed around the lower edge of hub ring 82, and extends outwardly substantially normal thereto defining a generally L-shape in section. A downwardly-dependent annular wall 88 extends around the exterior of the flange 86.

A mounting flange 90 is provided along one edge of flange 86, and has a screw receiving opening 92 for screw 94.

Screw 94 is intended to be received in recess 68 in block portion 64 of upper bearing hub member 24.

The flange 86 also defines a central opening 96 therethrough. In order to close this opening the closure plate 30 comprises a fastening sleeve 98, with a locking ring 100 adapted to make a snap fit within opening 96. A generally flat disc-like plate 102 is moulded to the bottom edge of the sleeve 98.

Screws indicated as 104 may be fastened through suitable holes drilled in the end portions of tracks 10, and such screws will then be received in screw recesses (not shown) formed in the respective block members 40 and 70.

In this way, the corner junction assembly can be connected between two adjacent lengths of track 10 as shown in Figure 5, and the two lengths of track are then rendered swingable relative to one another, within the limits of the arc defined by the construction of the corner junction member.

As is also shown in Figure 3, the traveller control means, namely the control cord 16 and the control rod 18, extend through respective openings in the wall or cup member 52, and extend around the arc of the corner. Pull cords 16 are guided around the corner, by pulleys 43 and 69, and by a further pulley 105 mounted in the interior of the wall 52, typically by being fastened to the underside of the plate 50.

The control cord 16 runs through the spaces on opposite sides of plate 36 and flange 58 and there constitutes a movement transmission means. Portions of wall 52 may be broken away, along lines 54, to allow free passage of the pull cords through the corner assembly 20.

Traveller engagement means such as buttons 107 are provided on cords 16, as described in U.S Patent 4,653,564, and require no further description.

The control rods 18 may be coupled by means of a movement transmission means or flexible coupling 106, described below.

A typical traveller 14 used in this type of blind is shown in Figure 6.

Alternatively, however, the invention is equally applicable to blinds in which a modified form of traveller 108, as shown in Figure 7, is used. In this form of traveller a control rod 110 is provided, for a similar purpose to the control rod 18 in the traveller 14; that is to say, the control rod 110 rotates the slats, as does the control rod 18 in the embodiment of Figure 6.

However, the traveller 108 differs from the traveller 14 in that the pull cord 16 is replaced by a continuous screw rod 112. The interior of the traveller is so constructed that by the rotation of the screw rod 112 the travellers are caused to move to and fro along the track.

The details of such travellers are well known to persons skilled in the art and require no further description.

In this form of the invention, two flexible couplings 114 and 116 would be provided in each corner: one joining two control rods 110 and, one joining two screw rods 112. The two flexible couplings would be similar to the single flexible coupling 106 shown in Figures 2, 3 and 8.

The flexible coupling 106 is shown in more detail in Figure 8, from which it will be seen to comprise a length of helical wound spring wire 120, the two ends of which are embedded in identical coupling members or drive hubs 122 which are relatively elongated and which fit, with a certain degree of clearance, within openings or bearing means 38 and 60 of the corner ring member 22 and the bearing hub member 24 respectively (see Figure 3).

Collars 124 are formed on hubs 122 and act as thrust plates, so as to ensure that the hubs 122 remain in the correct position, and rotate freely.

The free ends of hubs 122 are provided with splined recesses 126, to receive adjacent ends of the two control rods 18.

The spring portion 120 is flexible (as shown in

phantom) and will normally be straight, and can be flexed to fit around the desired angle to which the corner junction assembly 20 is set.

An alternative form of movement transmission means is shown in Figures 9 and 10.

As shown in Figure 9, a movement transmission means indicated generally as 130 comprises two crown gear wheels 132a, 132b each having identical teeth 134 formed thereon. The teeth 134 are formed essentially as pins or rods, with reinforcing web portions 136 (Figure 10) extending therefrom at an angle. Both crown wheels 132 are formed with a splined recess 138 to receive the end of the respective control rod 18. Within each recess 138, there is provided a spring 140.

The effect of the two springs 140 is to urge the two gear wheels 132a and 132b into engagement with one another at the various different angles to which the corner assembly may be set.

In the embodiment of Figures 1, 2 and 3, the track 10 is shown in which the travellers and all of the moving parts are contained inside the tracks.

However, there are certain manufacturers who manufacture tracks in which some of the controls are arranged exteriorly of the track.

One such form of track is shown in Figure 11 as 150.

In this case, the travellers, (not shown) are located within the track in essentially the same way as is shown in Figure 2. In addition, control rods (not shown) are arranged within the tracks.

In the form of track shown in Figure 11, however, the manufacturer has chosen to provide flexible control elements 152 which are located externally on the concealed or rearward side of the tracks 150. The control elements 152 are attached to traveller brackets 154 connecting with the lead travellers in each group.

The traveller brackets 154 extend through slots 156.

In the case of this form of track, the present invention provides a modified form of corner assembly indicated generally as 160.

The corner junction assembly 160 is made substantially as shown in Figures 3 and 4, but without the interior pulleys for guiding the flexible elements.

Instead, exterior pulley mounting brackets 162 are provided on the rearward or concealed side of the corner 160, having pulleys 164 mounted thereon.

Two pulleys are provided for each of the flexible elements making a total of four in all.

The two pulley mounting brackets 162 are attached to the corner assembly 160 in such a way that when the corner assembly is swung to a desired angular position, the pulley mounting brackets 162 will also swing apart from one another. Thus the pulleys 164 will remain in engagement with the flexible elements at all times.

Reference will finally be made to Figure 12 in which there is indicated generally at 170 a corner junction assembly for use with tracks 172 housing control rods 110 for changing the rotational position of the slats and screw rods 112 for moving the slats along the tracks.

Rotational movement is transferred in the corner junction assembly 170 between the control rods 110 in essentially the same manner as already described with reference to the embodiment shown in Figures 9 and 10.

In the embodiment shown in Figure 12, the control rods 110 pass through inner bearing members 174 having splined axial bores 176 receiving the control rods 110 for co-rotation therewith. The inner bearing members 174 are rotatably received within bores 178 formed in fixed mounting sleeves 180. The ends of the control rods 110 are secured in openings in crown gear wheels 184a and 184b having teeth 185 by set screws 186. It has been found that, by disposing the drive transfer members so that the teeth 134 rotate through a position which lies essentially on the rotational axis 187 of the corner junction assembly 170, the need for relative axial movement of the control rods 110 and the crown gear wheels 184a and 184b is eliminated. Consequently, in this particular embodiment, there is no need for the compression springs 140 as shown in Figure 10.

Similarly, rotational movement is transferred in the corner junction assembly 170 between the screw rods 112 in essentially the same manner as already described with reference to Figure 8 using a flexible coupling indicated generally at 188. From Figure 12, it will be seen that the flexible coupling 188 comprises a length of helically wound spring wire 190, the ends of which are anchored in couplings 192 which are, in turn, mounted for limited axial movement in bores in drove hubs 194 The couplings 192 and the bores in the drive hubs 194 have corresponding non-circular cross-sectional shapes, for example, hexagonal, to ensure conjoint rotation of the couplings 192 and the drive hubs 194.

The drive hubs 194 are provided with axially spaced apart annular grooves 195 and 196 which receive corresponding ribs 198 provided on the corner junction assembly 170 to permit free rotation of the hubs 194.

In adjusting the angular position of the tracks 172, the couplings 192 move within the drive hubs 194. In the event that it is desired to position the tracks 172 at a relatively small angle, the drive hubs can be moved within the corner junction assembly 170 so that the ribs 198 are disposed within the recesses 195 rather than the recesses

196 as actually shown in Figure 12. This is effective to separate the drive hubs 194 a sufficient distance to permit the required separation of the couplings 192.

The drive hubs 194 are secured to the screw rods 112 by set screws 199.

The foregoing is a description of a preferred embodiment of the invention which is given here by way of example only. The invention is not to be taken as limited to any of the specific features as described, but comprehends all such variations thereof as come within the scope of the appended claims.

Claims

1. A corner junction assembly (20) for use in association with two adjacent blind tracks (10), said tracks (10) each being adapted to carry slat-carrying travellers (14) and each having at least one movable traveller control means (16, 18), said corner junction assembly (20) comprising:
at least one bearing ring means (22);
at least one bearing hub means (24) making a captive frictional fit within said bearing ring means (22) to permit relative rotation thereof;
track engagement means (40, 70) connected to respective ones of said bearing ring means (22) and said bearing hub means (24) for engagement with adjacent ends of respective ones of said tracks (10); and
at least one movement transmission means (16, 106) adapted to be coupled to and to transmit movement from a said traveller control means (16, 18) in one said blind track (10) to said traveller control means (16, 18) in the other said blind track (10).

2. A corner junction assembly (20) as claimed in Claim 1 and which comprises upper and lower said bearing ring means (22, 26) and upper and lower said bearing hub means (24, 28), said upper bearing hub means (24) making a captive frictional fit within said upper bearing ring means (22) and said lower bearing hub means (28) making a captive frictional fit within said lower bearing ring means (26), and said upper and lower bearing ring means (22, 26) being spaced apart.

3. A corner junction assembly (20) as claimed in Claim 2 and including an opening (96) in one of said upper and lower bearing hub means (24, 28); and
removable closure means (30) closing said opening (96).

4. A corner junction assembly (20) as claimed in Claim 2 and including a downwardly dependent arcuate cup member (52) formed integrally with said upper bearing hub means (24), and a bearing surface (42) of corresponding shape, formed on said upper bearing ring means (22) and guidingly engaging the exterior of said cup member (52).

5. A corner junction assembly (20) as claimed in Claim 4 wherein said cup member (52) is formed with a plurality of fracture lines (54) parallel to one another at spaced intervals therearound, whereby portions of said cup member (52) may be broken away during installation of said corner junction assembly (20) with said blind tracks (10) to accommodate different angular positions of said blind tracks (10).

6. A corner junction assembly (20) as claimed in Claim 1 wherein said bearing hub means (24) is formed with a locking ring (48) making a captive pressure fit within said bearing ring means (22).

7. A corner junction assembly (20) as claimed in Claim 1 and in which said movement transmission means (16) comprises at least one length of control cord (16) integrally formed with control cords (16) in each of said tracks (10) and constituting said traveller control means (16), and at least one pulley (43, 69, 105) for guiding said length of said control cord (16).

8. A corner junction assembly (160) as claimed in Claim 7 wherein said at least one pulley (164) is located externally of said bearing ring means (22) and said bearing hub means (24).

9. A corner junction assembly (20) as claimed in Claim 1 for use with blind tracks (10) in which said traveller control means (18) are rotationally mounted and in which said movement transmission means (106) is adapted to transmit rotational movement between said traveller control means (18) of said two blind tracks (10).

10. A corner junction assembly (20) as claimed in Claim 9, in which said movement transmission means comprises a flexible coupling (106) and which comprises at least one bearing means (38) supporting said flexible coupling (106).

11. A corner junction assembly (170) as claimed in Claim 10 and in which said flexible coupling (188) is adapted to be connected to said traveller control means (112) for conjoint rotation therewith but in such a manner that axial movement of said flexible coupling (188) relative to at least one said traveller control means (112) is possible to accommodate different angular positions of said blind tracks (172).

12. A corner junction assembly (20) as claimed in Claim 9 and in which said movement transmission means comprises interengaged gear means (132) adapted to be secured to ends of said traveller control means (18) of said blind tracks (10) for conjoint rotation therewith.

13. A corner junction assembly (20) as claimed in Claim 12 and in which said gear means (132) are adapted to be secured to said ends of said

traveller control means (18) for conjoint rotation therewith while permitting axial movement of said gears means (132) relative to at least one of said traveller control means (18) to accommodate different angular positions of said tracks (10).

14. A corner junction assembly (20) as claimed in Claim 13 and in which each at least one said gear means (132) comprises spring means (140) adapted to maintain said gear means (132) in engagement with each other regardless of the relative angular positions of said tracks (10).

15. A corner junction assembly (170) as claimed in Claim 12 and in which said gear means (184) are disposed for rotational movement through a rotational axial position (187) of said corner junction assembly (170) to eliminate the need for relative axial movement of said gear means (184) and said traveller control means (110) during movement of said blind tracks (172) into different angular positions.

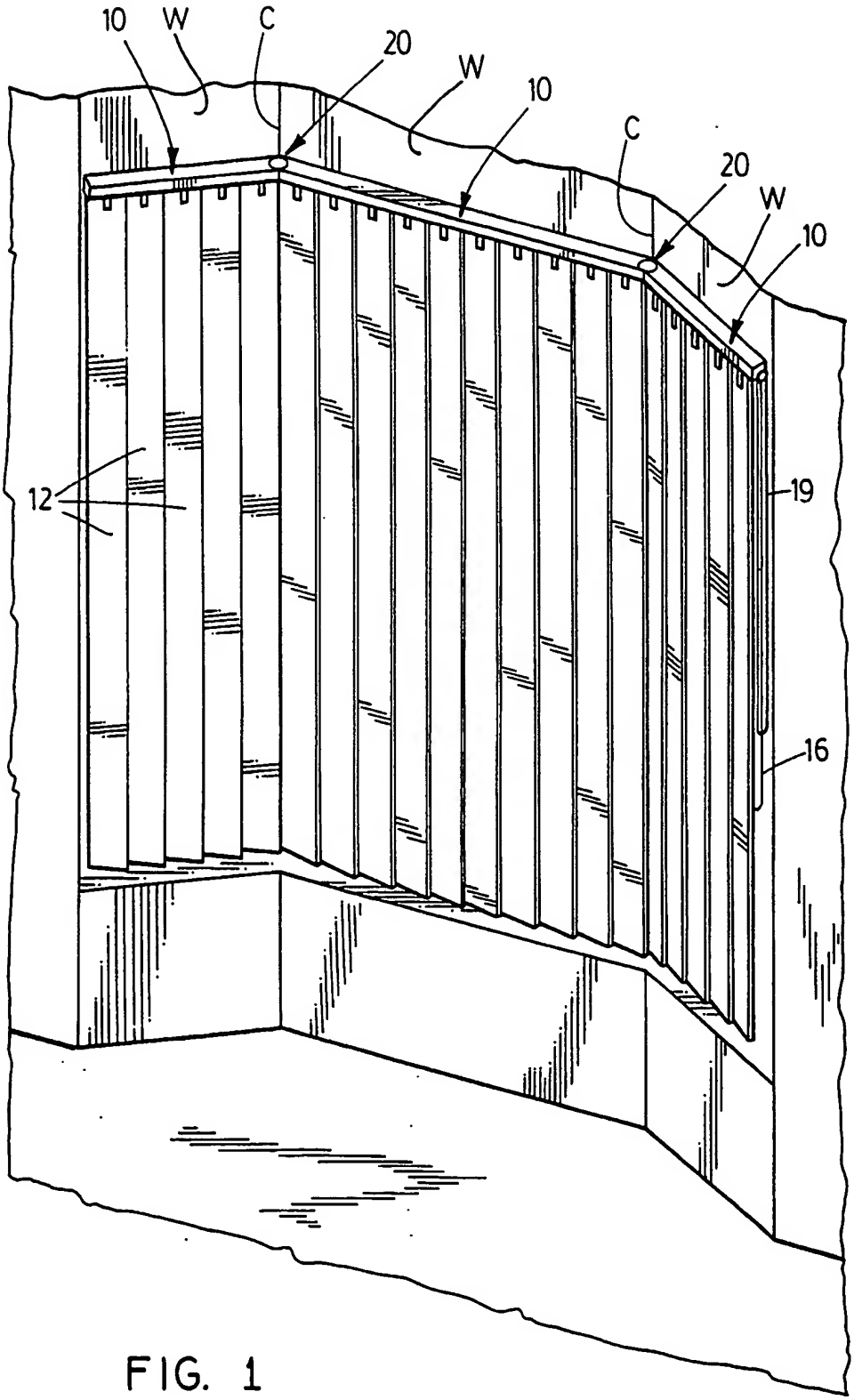

FIG. 1

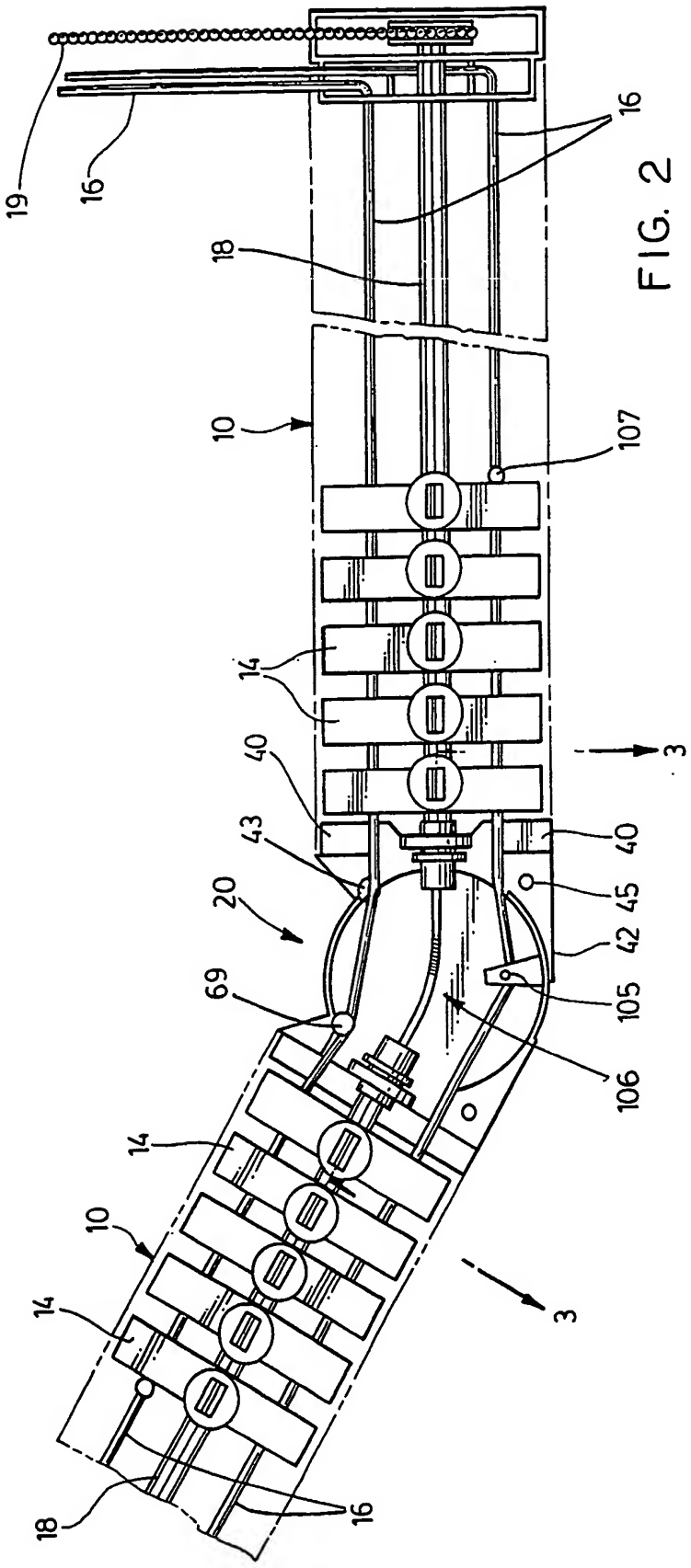

FIG. 2

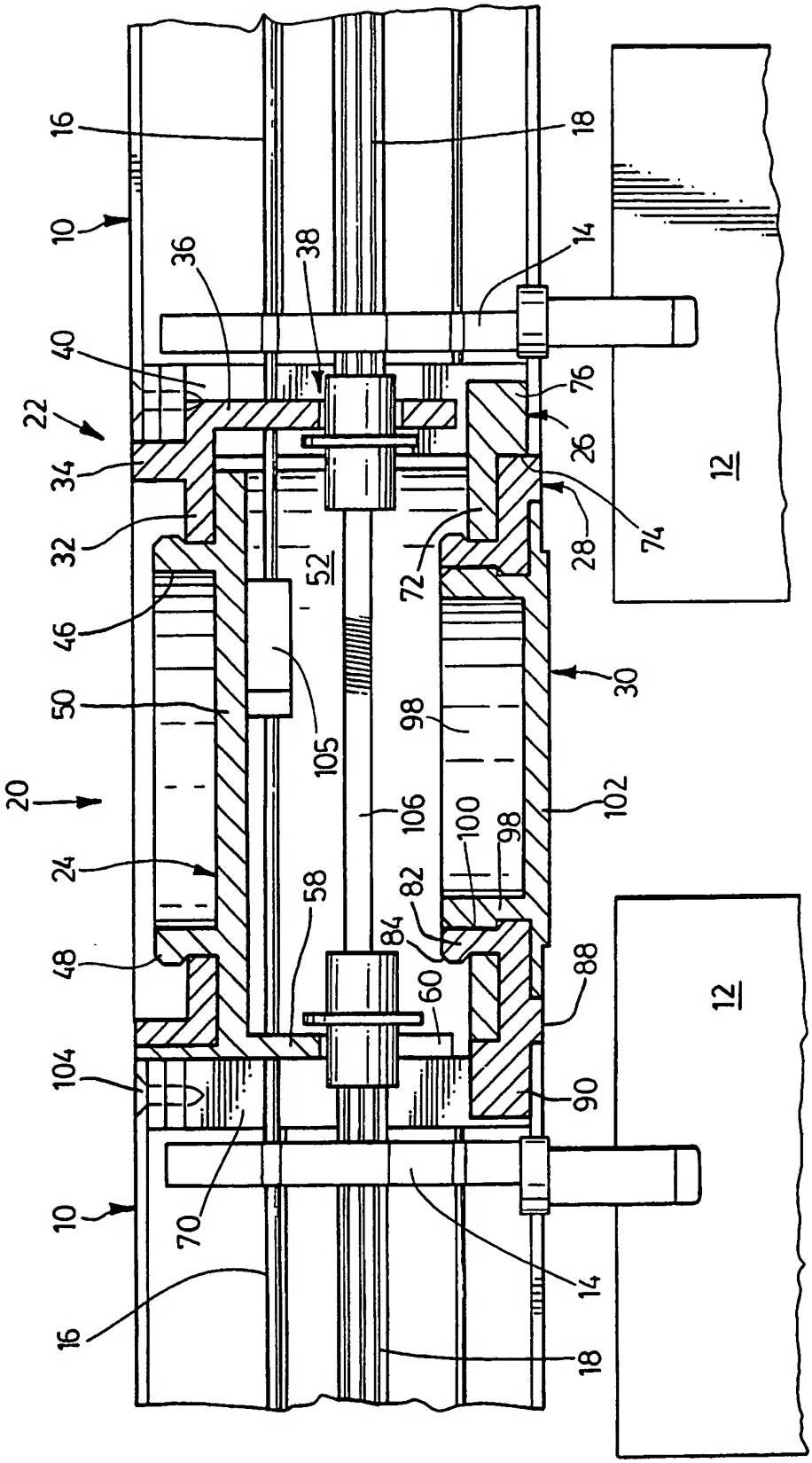
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FIG. 3

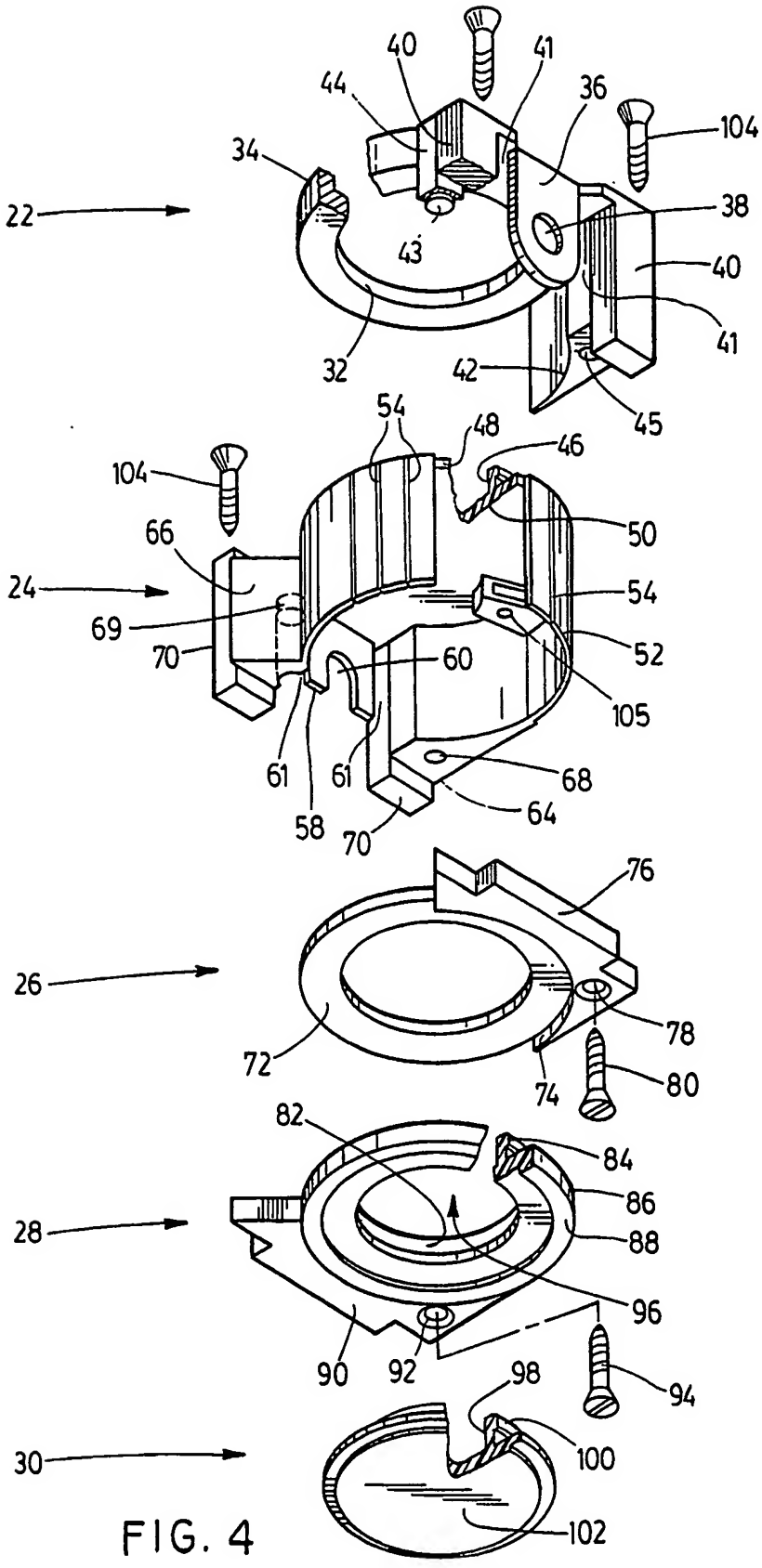
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FIG. 4

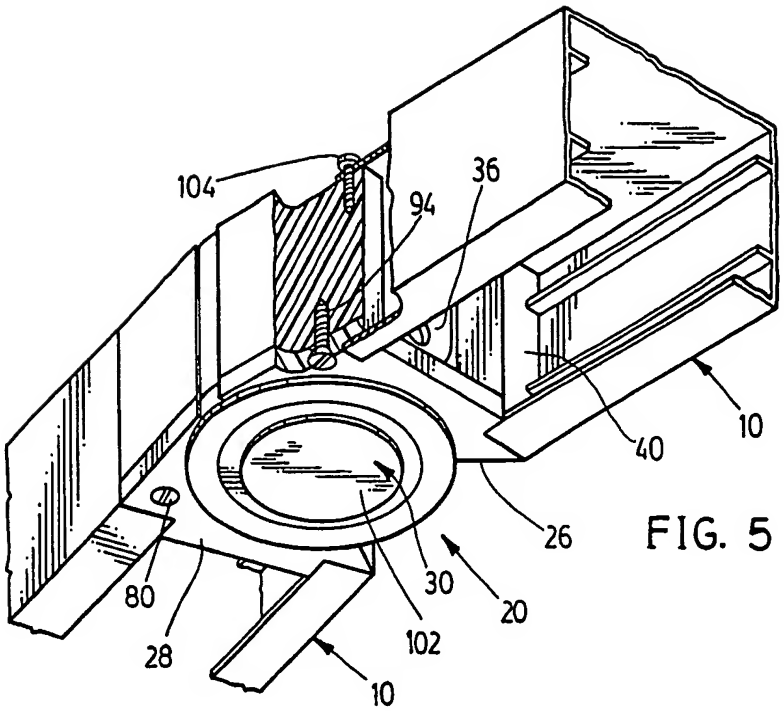

FIG. 5

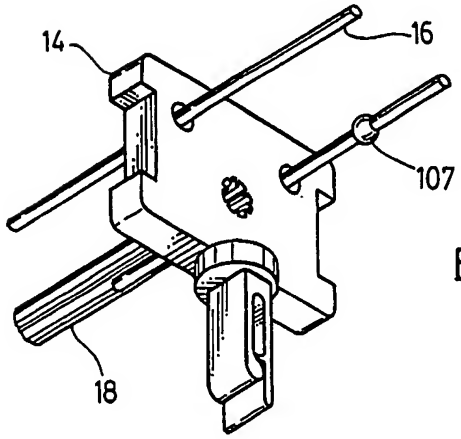

FIG. 6

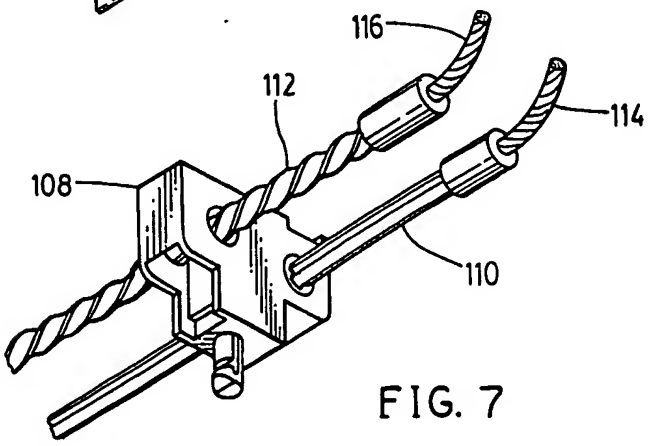

FIG. 7

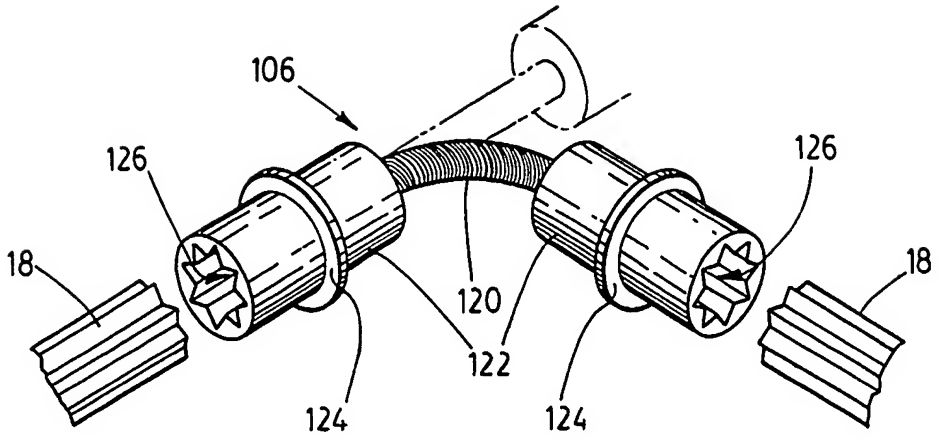

FIG. 8

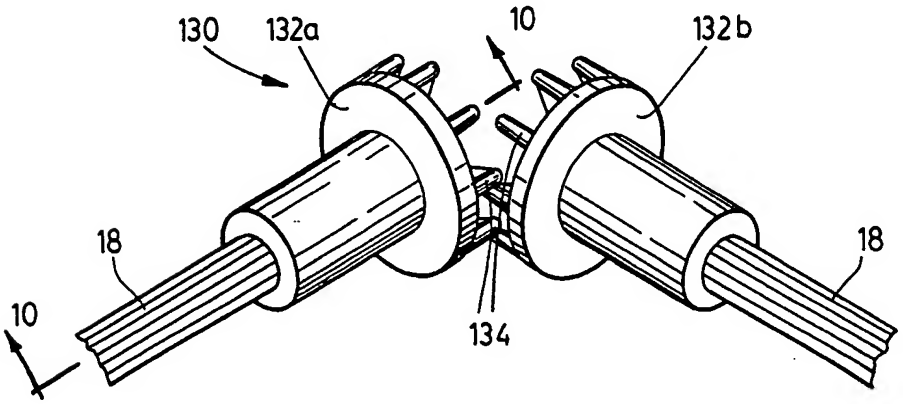

FIG. 9

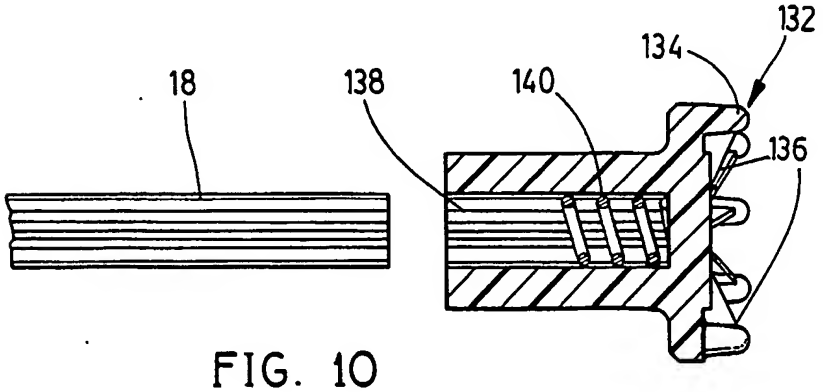

FIG. 10

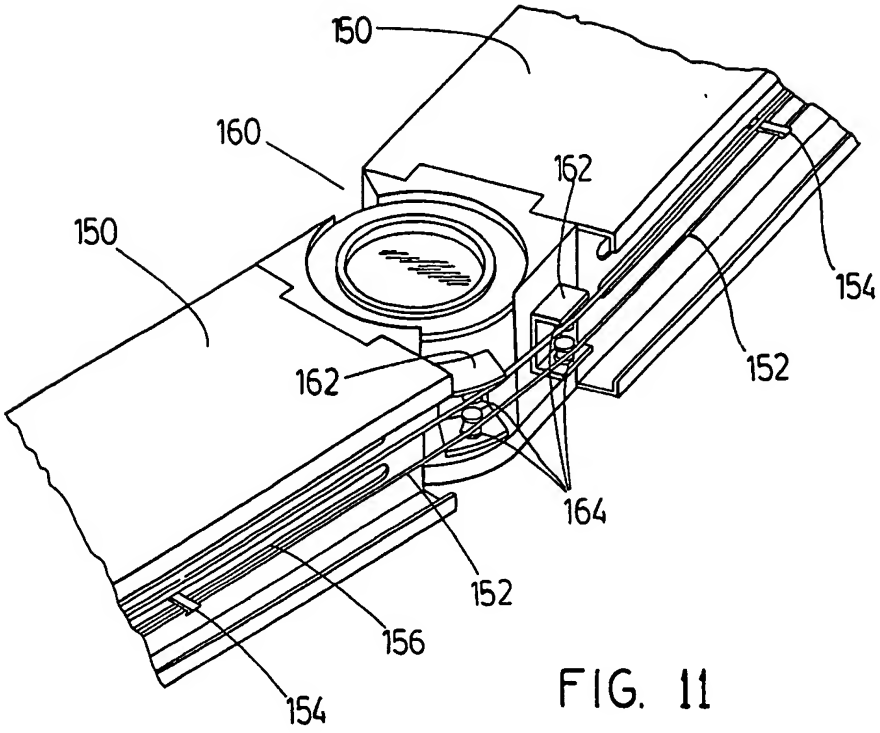
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FIG. 11

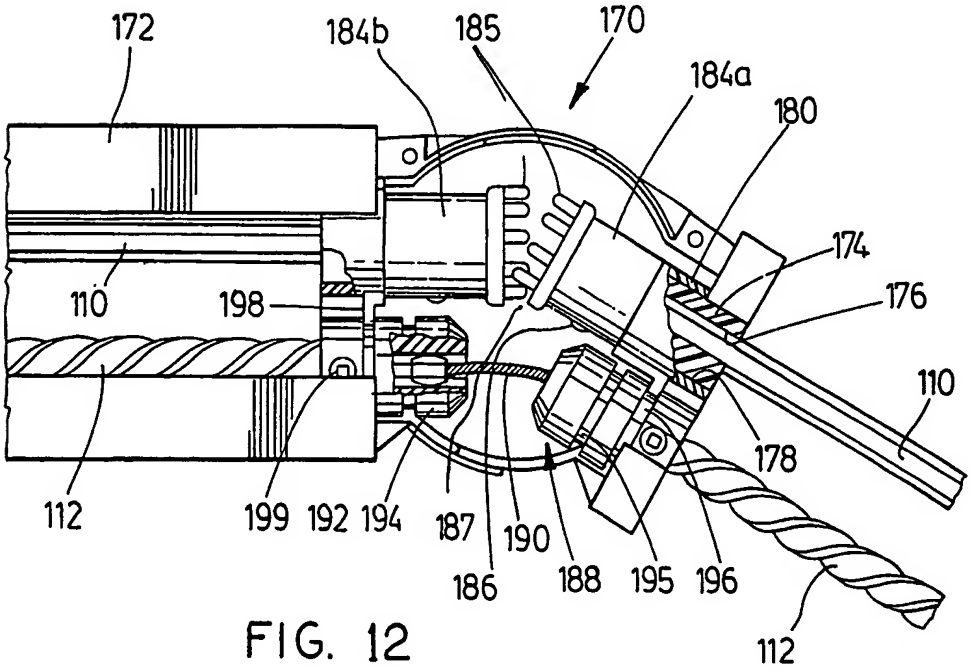
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FIG. 12